PLATE III.

FIG. 1.

FIG. 2.

Injuries of Four-lined Leaf-bug.

ENTOMOLOGY.[1]

The Four-lined Leaf-bug.—Another satisfactory monograph of a hitherto little-known injurious insect comes from the Cornell University Agricultural Experiment Station.[2] Mr. Slingerland reports that *Pœcilocapsus lineatus* has been destructive to currant foliage in New York for several years, sometimes rivalling, in damage done, the common currant-worm. Bushes on the university grounds "looked as though a fire had swept over them, leaving the prominent topmost leaves brown and dead." Such injury checks the growth of the bushes and materially lessens their productive capacity the following season. The past history of the insect is reviewed at some length, the discussion showing that it has been recognized as a destructive species for many years.

The four-lined leaf-bug shows an extraordinary range of food-plants, 54 species being listed as attacked by it. "Botanically considered, these lists are of interest, as they show an exceedingly wide range of food-plants for a single species of insect. Rarely do we find an insect attacking indiscriminately so many different plants with such widely different characteristics. The fifty-four species of plants represent forty-nine genera in thirty-one different families of the Flowering Plants. The Gymnosperms, like the pine, etc., are not represented, and but one genus (*Hemerocallis*) of the Monocotyledons. Fourteen of the plants are useful for food or medicine; twenty-nine are ornamental; while but eleven are wild species. Thus the beneficial results from the attack, rarely severe, of the insect upon the weeds, so termed, is slight compared with its frequently very injurious attacks upon the cultivated plants."

"The insect usually makes its first appearance in New York about the middle of May on the newest, tenderest terminal leaves. The insects are then so small and active in hiding themselves that they are not apt to attract attention. Their work, however, soon becomes apparent. Minute semi-transparent darkish spots appear on the terminal leaves. These spots are scarcely larger than a commonpin's head, and are round or slightly angular in shape, depending upon the direction of the minute veinlets of the leaf which bound them. The insect has inserted its beak into the leaf and sucked out nearly all of the opaque green pulp or parenchyma of the interior within a small area bounded by the little veinlets." These spots later turn brown

[1] Edited by Clarence M. Weed, New Hampshire College, Durham, N. H.

[2] Bull. 58. The Four-lined Leaf-bug. By Mark Vernon Slingerland. October, 1893.

and die; and, eventually, as the insects increase in size and destructive power, the leaves become withered and dead, as represented in Fig. 2 of the accompanying plate. "When all the tenderest leaves have succumbed, the insect continues its attack on the older leaves lower down. During its lifetime a single insect will destroy at least two or three currant or gooseberry leaves. This accounts for the fact that the injury wrought often seems much out of proportion to the number of insects at work.

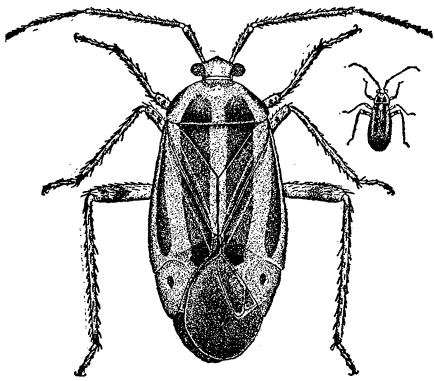

FIG. 1.—The adult insect; its natural size represented in small figure at the right.

"When the insects are very numerous, the growth of the shoots is often checked, they droop, wither, and die. Some have thought that this blasting of the growth was caused by a poisonous saliva which the insect injected into the wound made by its beak. However, it is more probable that the shoot dies or its growth is checked on account of the death of its breathing organs—the leaves. On the currant, gooseberry, and many other plants the insect confines its attacks to the leaves, but on some ornamental plants, as the dahlia and rose, the most frequent point of attack seems to be the buds."

Mr. Slingerland has, for the first time, traced the annual cycle of this pest. He finds that "the nymphs appear in the latter part of May upon shrubby plants where they continue to feed upon the tender leaves for two or three weeks, undergoing five moults. The adults appear early in June and often spread to different surrounding succulent plants. Egg-laying begins in the latter part of June; the eggs being laid in slits cut in the stems of shrubs near the tips of the new growth. The adults disappear in July and the insect hibernates in the egg. Only one brood occurs each year in our State."

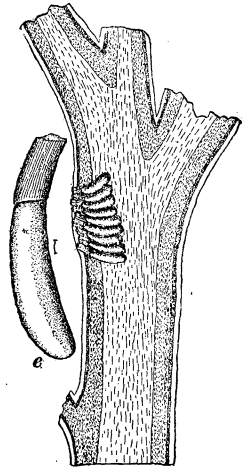

FIG. 2.—Section of currant stem showing eggs in position; *e*, egg, greatly enlarged.

The eggs are deposited in the stems, several being placed side by side in a longitudinal row (Fig. 2). The egg clusters as they appear on the surface of the young shoots are represen-

ted in the upper figure of the accompanying plate. After much experimenting, Mr. Slingerland finds that "there are three practicable methods by which this pest can be controlled: kerosene emulsion for the nymphs; destruction of the eggs by pruning; and the capture of the nymphs and adults by jarring into receptacles where they are destroyed. Circumstances will largely determine which method will prove the most practicable in specific cases."

The bulletin concludes with an extended bibliography and synonymy, and is represented by 13 figures, four of which are reproduced herewith.

Indiana Orthoptera.—Two important papers, by Mr. W. S. Blatchley of the Terre Haute High School, have recently appeared.[3] The first is entitled the Locustidæ of Indiana, thirty-nine species being catalogued, while a list of twelve others that are likely to be found in the State is given.

Concerning the musical powers and general habits of these katydids and their allies, Mr. Blatchley writes: "The stridulating or musical organ of the males is quite similar to that of the male cricket, being found at the base of the overlapping dorsal surface of the tegmina, and usually consisting of a transparent membrane of a more or less rounded form, which is crossed by a prominent curved vein, which, on the under side, bears a single row of minute file-like teeth. In stridulating the wing covers are moved apart and then shuffled together again when these teeth are rubbed over a vein on the upper surface of the other wing cover, producing the familiar so-called 'katydid' sound. Each of the different species makes a distinct call or note of its own, and many of them have two calls, one of which they use by night and the other by day. Anyone who will pay close attention to these differ-

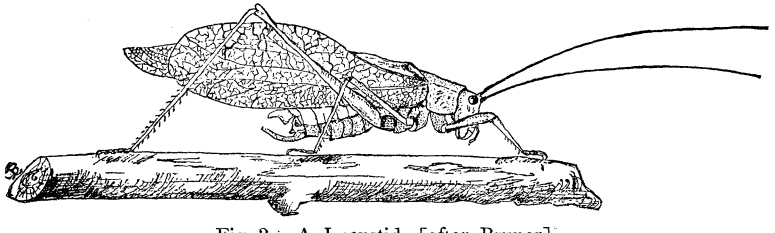

Fig. 3. A Locustid. [after Bruner].

ent calls, can soon learn to distinguish each species by its note as readily as the ornithologist can recognize different species of birds in the same

[3] Proceedings Indiana Acad. Science, 1892, pp. 92–165.

manner. The ear of these insects, when present, is also similar in structure and position to that of the crickets, being an oblong or oval cavity covered with a transparent or whitish membrane, and situated near the basal end of the front tibiæ.

"The young of the Locustidæ, like those of the other families of the order, when hatched from the egg, resemble the adult in form, but are wholly wingless. As they increase in size they molt or shed their skin five times, the wings each time becoming more apparent, until after the fifth molt when they appear fully developed, and the insect is mature or full-grown, never increasing in size thereafter. Throughout their entire lives they are active, greedy feeders, mostly herbivorous in habit; and where present in numbers, necessarily do much damage to vegetation."

Mr. Blatchley's other paper is entitled "The Blattidæ of Indiana." Seven species belonging to five genera of cockroaches are catalogued.

"From the other Orthoptera the Blattidæ differ widely in the manner of oviposition, as the eggs are not laid one at a time, but all at once in a peculiar capsule or egg case called an oötheca. These capsules vary in the different species as regards the size, shape and the number of eggs they contain, but they are all similar in structure. Each one is divided lengthwise by a membranous partition into two cells. Within each of these cells is a single row of cylindrical pouches, somewhat similar in appearance to those of a cartridge belt, and within each

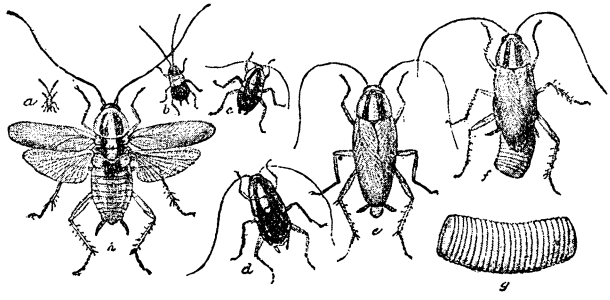

FIG. 4.—Croton Bug: *a*, first stage; *b*, second stage; *c*, third stage; *d*, fourth stage; *e*, adult; *f*, adult female with egg-case; *g*, egg-case —enlarged; *h*, adult with wings spread—all natural size except *g*.

pouch is an egg. The female cockroach often runs about for several days with an oötheca protruding from the abdomen, but finally drops it in a suitable place, and from it the young in time emerge." An introduced tropical species, *Panchlora viridis*, is viviparous.

"All young cockroaches resemble the parents in form, but are wholly wingless, the wings not appearing until after the fifth or last molt. The young are often mistaken for mature individuals." The stages of the common "Croton Bug," as represented by Dr. Riley, are shown in Fig. 4.

A Curious Hemipteron.—About the middle of January I received a curious looking specimen of Hemiptera which was taken in an agricultural implement warehouse. Owing to the extremely warm weather, the creature was quite active, and at first glance resembled an animated bit of rusty metal upon legs.

It proved to be of the family Reduviidae, recognized according to Latrielle by the elongated head which is free from the thorax, prominent eyes and two ocelli, antennæ of moderate length, filiform toward the ends and stout incurved beak. The tarsi are three-jointed, and the legs long and fitted for running.

This insect could probably be classified with *Reduvius personatus*, although of a reddish-brown rather than black, as members of this genus are said to have a habit of enveloping themselves in a thick coating of dust. This particular specimen was entirely covered with iron-dust and rust, possibly the only material at hand, and even the first joints of the antennæ and the densly hirsute limbs were thickly encased. The fourth hair-like antennal joints and the tarsi were clear of dust. Under the microscope numerous sharp, shining particles of steel and iron filings were to be seen, and the back, wingless and very concave, was heavily weighted. The insect moved rapidly, but with a peculiar creeping and halting gait, and proved to be very hard to kill. I first experimented with sulphur smoke, which had no perceptible effect. Then I placed the specimen in a prepared insect bottle, containing cyanide of potassium so strong that almost any soft bodied insect would become motionless instantly, and in this Reduvius lived several hours. Whether this was owing to the season of the year or to its unique coat of mail, I am unprepared to say.—LAURENE HIGHFIELD, *Quincy, Illinois.*

North American Membracidæ.—Dr. F. W. Goding has prepared a very useful catalogue of North American tree-hoppers.[4] Nearly three hundred species are included in the list, a considerable number of them being here described for the first time. Dr. Goding

[4] Bibliographical and Synonymical Catalogue of the Described Membracidæ of North America. By F. W. Goding, M. D., Ph.D. Bull. Ill. St. Lab. Nat. Hist., V. III, Art. XIV. Champaign, Ill., 1894.

has had access to ample collections and literature, and has filled nearly one hundred pages with the bibliography of this comparatively small family.

Colors of Lepidopterous Larvæ.—Prof. E. B. Poulton has an abstract of a memoir[5] entitled "The experimental proof that the colors of certain Lepidopterous Larvæ are largely due to the modified plant pigments derived from food." He divided into three lots one batch of eggs laid by *Tryphæna pronuba*, and fed them in darkness on green leaves, on yellow etiolated leaves and white midribs of cabbage. The last, whose food contained neither chlorophyll nor etiolin, were entirely unable to form the green or brown ground color.—*Journal Royal Microscopical Society.*

Effect of Arsenites on Caterpillars.—Professor C. H. Fernald reports[6] that in a series of experiments with various insecticides it was found that "gypsy caterpillars, when half-grown or larger, are not destroyed by any proportion of Paris green in water that can be used on fruit trees without injury to the foliage." A new insecticide—arsenate of lead—was tried with satisfactory results. "It did not injure even the most delicate foliage, however large a proportion was used. In one case, 24 pounds to 150 gallons of water were used without injury to the leaves."

Life-history of the Mole Cricket.—Some interesting details of the life-history of the European mole cricket (*Gryllotalpa vulgaris*) were recently communicated by M. F. Decaux to the *Societé Entomologique de France.*[7]

In some specimens under observation copulation took place April 15; the eggs were deposited by the end of April, and hatched May 15. At first the young are gregarious. All the young of a given brood do not mature at the same time; those maturing earliest reproduce 25 months after hatching, others 28 months, and a few even 35 months. These insects, M. Decaux says, are essentially carnivorous—feeding on insects, worms and slugs—but they accommodate themselves very well to a vegetable diet. He believes that the galleries are made not to pursue insects, but as places of defense and concealment.

News.—Prof. Charles Robertson has issued another instalment of his valuable papers on Flowers and Insects.

[5] Trans. Ent. Soc. London, 1893, pp. 255–265.

[6] Thirty-first Rep. Mass. Agr. College, p. 23.

[7] Bull. des Seances, No. 20, p. CCCXLI.

In his address as retiring president of the Cambridge Entomological Club, Mr. Wm. H. Ashmead discussed "The Habits of the Aculeate Hymenoptera." The address is being printed in *Psyche*, and is a paper of unusual biological interest.

Mr. F. J. Buckell discusses, at some length,[8] the proper name for the butterfly, variously known as *Danais archippus* or *Anosia plexippus*, and concludes that the insect should be called *Anosia archippus*.

Mrs. A. T. Slosson publishes[9] an interesting list of insects taken in the alpine region of Mt. Washington.

Mr. Howard Evarts Weed issues, as Bulletin 27 of the Mississippi Experiment Station a valuable discussion of insecticides, and their application.

In Bulletin No. 23 of the Maryland Experiment Station, Dr. C. V. Riley treats of some Injurious Insects of Maryland.

Mr. H. F. Wickham records[10] some interesting observations on the habits of oceanic Hemiptera. His observations indicate that Halobates may be drowned by submergence; and open up again the question as where these insects remain during stormy weather.

In his annual report on the gypsy moth, Prof. C. H. Fernald says: "In 1891, some experiments were made to determine what could be done toward entrapping the male moths by exposing females. In the spring of 1893, Prof. Shaler recommended that the monitor trap be tried on a large scale. This was done by enclosing the females in boxes covered on two sides by fine wire netting, and attaching to such boxes two sheets of paper covered with a resinous coating to which the male moths adhered. Fifteen traps were exposed in Malden, and 1,771 male moths were caught. The fact that so many moths were destroyed at a small expense, seems proof that trapping will prove an effectual and inexpensive method of preventing the increase in the numbers of the moth, especially as the males now seem to be comparatively scarce."

[8] Ent. Record, V. 1.
[9] Ent. News, V. 1.
[10] Ent. News. V. 33.